FACT SHEET FOR NPDES PERMIT WA0037265
Pioneer Clor Alkali Compnay, Inc.

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APPENDICES

INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) permits which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the state of Washington on the basis of RCW 90.48 which defines the Department of Ecology's (the Department) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing permits (Chapter 173-220 WAC), and water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least 30 days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

This fact sheet has been prepared by the Permittee in accordance with the directive of Washington State Substitute House Bill 1743, Permit Writing Pilot Study. The fact sheet and the permit have been reviewed by the Department prior to commencement of the public comment period. After the public comment period has closed, the Department/Permittee will summarize the substantive comments and the response to each comment. The summary and response to comments (Appendix D) will become part of the file on the permit and parties submitting comments will receive a copy of the Department's/Permittee's response. The fact sheet will not be revised. Changes to the permit will be addressed in Appendix D--Response to Comments.

GENERAL INFORMATION

Applicant:	Pioneer Clor Alkali Company, Inc.
Facility Name and Address:	Pioneer Clor Alkali Company, Inc. 605 Alexander Avenue Tacoma, Washington 98421
Facility Contact:	Maurice H. Wassmann Phone: (206) 593-1356 Fax: (206) 593-1344
Type of Facility:	Inorganic Chemicals Manufacturing - Chlor-Alkali SIC Code: 2812, 2819
Discharge Location:	Mouth of the Hylebos Waterway in Commencement Bay Latitude: 47° 16' 48" N. Longitude: 122° 24' 11" W.
Water Body ID Number:	WA-10-0020

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

History

Pioneer Clor Alkali Company, Inc. (Pioneer Clor) owns and operates a chlor-alkali plant (Figures 1 and 2) which discharges wastewater to the mouth of the Hylebos Waterway in Commencement Bay. The facility began operation in 1929. Since that time, Pioneer Clor has initiated and closed several different manufacturing processes and has undergone several expansion phases. The last major expansion occurred in 1988. The facility occupies approximately 33 acres in the industrial port area of Tacoma, Washington.

Industrial Process

Chlor-alkali refers to the production of chlorine and sodium hydroxide (caustic, caustic soda). Chlor-alkali production at the Pioneer Clor facility is accomplished via the electrolysis of a sodium chloride/water solution. Pioneer Clor's electrolytic process utilizes approximately half diaphragm-type cells installed in 1981 and half membrane cells installed in 1988. The diaphragm cells are constructed of titanium anodes and carbon steel cathodes while the membrane cells contain titanium anodes and nickel cathodes. Facility operation occurs 24 hours per day, 365 days per year.

Pioneer Clor also operates a muriatic (hydrochloric) acid plant and a calcium chloride plant at this facility. An ammonia plant that had operated since the mid-1950's was permanently shut down in early 1992. Production of sodium hypochlorite bleach was also discontinued in 1992. The remaining commercial products are thus Chlorine (Cl_2), Sodium Hydroxide (NaOH) 50 percent, Muriatic Acid (HCl) 32-35 percent, and Calcium Chloride ($CaCl_2$) 35 percent.

Pioneer Clor formerly operated a chlorinated solvents (trichloroethylene, perchloroethylene) production plant at the northeast end of the facility from 1947 to 1973. This operation resulted in groundwater contamination with chlorinated organic compounds. A RCRA corrective action under U.S. EPA management is currently addressing the clean-up of this site. Pioneer Clor installed and started up in early 1994 a ground water treatment system at the former solvents plant site. Initially only pilot extraction wells and collection tiles were installed and tested, but construction of a full-scale injection/extraction system has just been completed and is in operation. Treated water from the groundwater treatment plant was formerly discharged to the facility's outfall, but during normal operation it will now be reinjected into the ground to create a hydraulic barrier along the waterway.

Raw materials for the facility come from a number of sources. About 10-15 percent of source water is from the City of Tacoma water system, while the remainder is pumped from the Hylebos Waterway. Solar (sodium chloride) salt is shipped from Mexico by freighter. Limestone rock is purchased locally and used for calcium chloride production.

Figure 1. Tacoma vicinity map

Figure 2. Site map

Raw sodium chloride salt is stored in a mound on a paved and bermed pad (Figure 3). A combination of city water, stormwater, and recycled process water is sprayed on the salt to produce brine. Since the salt contains natural impurities such as calcium and magnesium (in the form of chloride salts) as well as other trace inorganic constituents, the raw brine is chemically treated. Sodium carbonate and sodium hydroxide are used to precipitate the impurities and form insoluble salts which can then be filtered from the brine solution. The resulting brine filter cake is either shipped off site for use in making concrete or sent to a landfill. The chemically purified and filtered brine is then either: 1) further purified via ion exchange prior to use in the membrane cells; or 2) concentrated to saturation prior to use in the diaphragm cells.

The electrolytic cells produce chlorine, hydrogen, and a dilute solution of sodium hydroxide. Hydrogen is used as a raw material in the muriatic acid plant and is also burned in the boilers as fuel. Muriatic acid is reacted with calcium carbonate limerock to produce calcium chloride.

After initial cooling steps, the chlorine gas is "dried" with sulfuric acid which produces a low-pH wastewater stream. The dry chlorine gas is then compressed and liquefied. Wastewater containing chlorine is steam-stripped to recover product. Sodium bisulfite is primarily used to neutralize the remaining residual chlorine in the wastewater with sodium thiosulfate available as a back-up.

Dilute sodium hydroxide from the cells is concentrated to 50 percent solution using steam in a vacuum evaporation system. Barometric condensers serve to condense a portion of the steam vapors from the process and maintain vacuum on the system. Sea water is used as contact cooling water in this process. The resulting untreated wastewater can have elevated pH.

Salt recovered in the evaporation process is recycled to the brine process. Brine containing sodium sulfate is collected in the evaporation process and continuously purged to the wastewater discharge. Alternatively, the solution is treated to further concentrate and separate the sodium sulfate which is subsequently batch purged to the wastewater discharge. The brine is then recycled to the brine process.

Hylebos intake water is periodically chlorinated to minimize biological fouling of equipment. Prior to discharge to the outfall, the water is dechlorinated with sodium bisulfite. Process wastewater is also treated by pH neutralization. Adjustment of pH presently occurs in two locations. Low-pH wastewater from the chlorine stripping unit is partially neutralized. After the low-pH and high-pH streams combine, final neutralization occurs prior to discharge to the Hylebos.

According to the last 12 months of DMR data, Pioneer Clor has discharged an average flow of 18.4 MGD with a maximum of 23.2 MGD. Approximately 26 separate internal wastewater streams contribute to this flow. Eleven streams are contact wastewater and account for approximately half of the flow. The source of the contact streams include the chlorine stripper, the barometric condensers, compressor seals, and miscellaneous wash waters. There are approximately 15 non-contact cooling streams.

Figure 3. General plant map

Discharge Outfall

All process wastewater streams combine at a "mixing box" where compliance sampling is conducted. Stormwater mixes with the process wastewater in common underground conveyances flowing to the mixing box. There is no separate stormwater system. A pipe from the mixing box leads to a diffuser, located 80 feet away and approximately 26 feet below Mean Low Low Water in the Hylebos Waterway. The diffuser consists of a tee with two 24 inch nozzles 20 feet apart pointing horizontally into the channel at right angles to the bank. This is the facility's only outfall. Sanitary wastewater, as well as analytical laboratory wastewater, discharge to the City of Tacoma municipal sewer system.

PERMIT STATUS

The previous permit for this facility was issued on 11/15/91. The permit was subsequently modified on 6/9/93, 3/2/94, and 2/22/95. The previous permit placed effluent limitations on the following parameters:

A. **Outfall 002**

Table 1. Effluent limitations for outfall 002

Parameter	Monthly Average	Daily Maximum
Flow (gallons/day)		24,500,000
Temperature (°C)	N/A	32.0[1], 24.0[2]
TSS (lbs/day)[3]	365	720
Copper[4] (µg/l)	9.3	13.2
Lead[4] (lbs/day)	1.2	2.5
Nickel[4] (lbs/day)	1.4	2.5
Total Residual Chlorine (µg/l)	12	35
pH[5](S. U.)	******** 6.0 to 9.0 ********	
Ammonia (as Nitrogen) (lbs/day)[6]	7.3	12.5

[1]When the most recently measured receiving water temperature is less than 18.5°C.

[2]When the most recently measured receiving water temperature is 18.5° C or greater.

[3]Limitation is based on net value (i.e., Discharge - Intake).

[4]Measured as total recoverable metals.

[5]Conditional allowances for excursions.

[6]OxyChem discontinued ammonia production in early 1992, after which this limitation no longer applied.

B. **Internal Waste Stream - Groundwater Treatment Effluent (GTE)**

Table 2. Effluent limitations for GTE internal waste stream

Parameter	Daily Maximum (mg/l)
Chloroform	75
Carbon Tetrachloride	10
1, 1-Dichloroethylene	5
1, 1, 2, 2-Tetrachloroethane	180
Tetrachloroethylene	50
1, 1, 2-Trichloroethane	5
Trichloroethylene	440
Methylene Chloride	185

An application for permit renewal was submitted to the Department on 2/14/96 and accepted by the Department on 3/6/96.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility last received an inspection on 1/13/96. A phased Class 2 inspection was conducted on September 1-2, 1992 (dry weather portion) and December 7-8, 1992 (wet weather portion). Inspection data found the Pioneer Clor discharge was of similar quality to that which was withdrawn from the waterway. The Pioneer Clor discharge was within the limits specified in the NPDES permit. Effluent priority pollutant organic and metal concentrations were less than the EPA acute and chronic water quality toxicity criteria for salt water. Bioassays indicated possible limited toxicity of the discharge, however, the data was inconsistent. Subsequent biomonitoring by the Permittee has shown no signs of acute or chronic toxicity.

Except for a few specific incidents, from 1992 through 1995 Pioneer Clor has consistently been in compliance with the effluent limitations in their permit. Table 3 summarizes the incidents of permit violations.

Table 3. Summary of excursions of permit effluent limitations

Month	Year	Parameter	Cause
Jan	1992	Ammonia	Overfilled ammonium hydroxide truck
Aug	1992	TRCl	Process/treatment system upset
Dec	1993	pH	Operator error - inappropriate valve switching
Jan	1994	pH	Process upset following power failure
Feb	1994	pH	Process upset in caustic evaporation system
Apr	1994	Lead	Possible sample contamination/storage problem
Dec	1994	TRCl	Chlorine stripper pH upset
Jan	1995	TRCl	Treatment system upset - low SO_2 pressure
Jun	1995	pH	Low effluent flows during planned plant shutdown

Month	Year	Parameter	Cause
Jul	1995	TRCl	Process/treatment system upset

The facility has taken or is taking the following actions which address the above violations:

1. Ammonia: The ammonia process was entirely shut down in early 1992. The facility no longer produces, stores, or transports ammonia or ammonium hydroxide.

2. TRCl: Under Compliance Order No. DE 93WQ-S190, Pioneer Clor was required to perform a study to identify and evaluate alternatives to reduce Total Residual Chlorine discharges. Pioneer Clor submitted a report to the Department on December 15, 1993, proposing a $500,000 project to install a dechlorination system consisting of in-line monitors and sodium bisulfite injection points on the four main sewers entering Pioneer Clor's outfall. The system was put into service in October 1995.

3. pH: Under Condition S4 of its current NPDES permit, Pioneer Clor was required to study its pH control system to determine any process modifications necessary to achieve compliance with the final (more stringent) pH limits set forth in that permit. Pioneer Clor submitted a report to the Department on
   July 8, 1994, proposing a $1.5 million project comprising several process modifications and upgrades. The Department formally accepted the report on August 10, 1994, and granted 25 months from the report's submittal date to complete construction. The project is currently on track for start-up by August 1996.

4. Lead: The lead violation in April 1994 could have been avoided through timely follow-up sampling. The lab technician compared the result to the facility's higher daily maximum limit and therefore did not correctly determine that the result exceeded the limit for the monthly average, which is lower. By the time the violation was identified, it was too late to conduct follow-up testing. It appears that the high lead level was an anomaly, possibly due to sample contamination. Pioneer Clor has implemented a program whereby raw analytical data undergoes timely review by several parties to determine compliance and allow time for follow-up sampling in the event of an anomalous result.

WASTEWATER CHARACTERIZATION

The proposed wastewater discharge is characterized for the following regulated parameters (taken from the Permittee's NPDES permit application and based on 1995 DMR data):

A. **Outfall 002**

Table 4

	Max. Daily Value		Max. 30 Day Value		Long Term Avg. Value	
Parameter	**µg/l**	**lb/d**	**µg/l**	**lb/d**	**µg/l**	**lb/d**
TSS (net)	NA	81	NA	81	NA	9
Lead	4	0.6	4	0.6	3	0.5
Copper	5	0.8	5	0.8	4	0.5

	Max. Daily Value		Max. 30 Day Value		Long Term Avg. Value	
Parameter	**µg/l**	**lb/d**	**µg/l**	**lb/d**	**µg/l**	**lb/d**
Nickel	4	0.7	4	0.7	3	0.4
TRCl	333[1]	2.3	11	0.08	<5[2]	0.009
Flow, MGD	23.2		21.0		18.4	
Temperature (winter), °C	29.0		26.2		25.1	
Temperature (summer), °C	30.0		28.5		27.9	

B. **Internal Waste Stream - Treated Groundwater (GTE)**

Table 5

	Max. Daily Value		Max. 30 Day Value		Long Term Avg. Value	
Parameter	**µg/l**	**lb/d**	**µg/l**	**lb/d**	**µg/l**	**lb/d**
Chloroform	ND 2	NA	ND 2	NA	ND 2	NA
Carbon tetrachloride	ND 2	NA	ND 2	NA	ND 2	NA
1,1-Dichloroethylene	ND 2	NA	ND 2	NA	ND 2	NA
1,1,2,2-Tetrachloroethane	ND 2	NA	ND 2	NA	ND 2	NA
Trichloroethylene	ND 2	NA	ND 2	NA	ND 2	NA
1,1,2-Trichloroethane	ND 2	NA	ND 2	NA	ND 2	NA
Tetrachloroethylene	ND 2	NA	ND 2	NA	ND 2	NA
Methylene chloride	ND 2	NA	ND 2	NA	ND 2	NA

As part of the last permit, Pioneer Clor was required to conduct a special monitoring study of internal streams in order to pinpoint the specific source of various pollutants. Pioneer Clor was also required to conduct a related study to evaluate waste reduction measures that could reduce or eliminate the discharge of pollutants. Pioneer Clor submitted a combined report for the two studies on 7/7/95. Among their findings were the following:

- No volatiles, semi-volatiles, or PCBs were detected in any intake, internal stream, or effluent samples.
- At least 50 percent of the copper in facility effluent comes from sea water and city water intakes.
- Nearly all of the lead and nickel in the facility effluent comes from sea water and city water intakes.
- Nearly all total suspended solids in the facility effluent come from the sea water intake.
- Regulated chlorinated organics in the groundwater treatment effluent have been non-detectable since start-up of the groundwater treatment system.
- The facility's end-of-pipe effluent has passed all whole effluent toxicity tests conducted in the past two and a half years, without the need of a dilution allowance.

Further discussions with Pioneer Clor, combined with inspection of their monthly DMR data, indicate the following (refer to Appendix C for a summary of Pioneer Clor's 1995 DMR data):

[1]Out of 365 TRCl measurements for 1995, 361 were ND (5 µg/L) and the rest were 8, 22, 183, and 333 µg/l.
[2]When computing the average, all non-detect values were calculated using half the detection limit, or 2.5 µg/l.

- Net total suspended solids are typically zero, confirming the primary source as sea water. The infrequent non-zero measurements can probably be attributed primarily to sample variability. The production processes at the Pioneer Clor facility do not contribute significant amounts of suspended solids to its effluent and they do not treat their effluent to remove solids.
- According to Pioneer Clor, the main source of non-intake copper in the facility effluent is probably slight corrosion of non-contact cooling equipment constructed of copper-containing alloys.
- The main source or sources of non-intake nickel in Pioneer Clor's effluent is not clear, although the facility does utilize both contact and non-contact cooling equipment constructed of nickel and nickel-containing alloys.
- Pioneer Clor completed a modernization of its production facility in 1988 that included shutdown and removal of older electrolytic cells partially constructed of lead. The facility no longer uses lead in its production process and lead levels in its effluent have steadily diminished to the background levels currently found in the sea water intake.
- The primary source of total residual chlorine in Pioneer Clor's effluent is effluent from an elementary neutralization unit that treats direct-contact cooling water from the chlorine liquefaction process. The secondary source is city water that is used for non-contact cooling. As stated earlier, Pioneer Clor has just completed a facility dechlorination project to eliminate periodic TRCl excursions.
- Pioneer Clor's effluent pH is within the 6 to 9 range 99.98 percent of the time. Excursions are typically of a short duration and result from significant process upsets such as power failures, emergency shutdowns, and plant start-ups. As stated earlier, Pioneer Clor is currently constructing several process modifications to minimize pH excursions.

SEPA COMPLIANCE

There are no SEPA compliance issues at this facility.

PROPOSED PERMIT LIMITATIONS AND CONDITIONS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific wastewater. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC) or Sediment Quality Standards (Chapter 173-204 WAC). The more stringent of these limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Technology based effluent limits have been derived based on the following:

1. Best conventional pollutant control technology (BCT) which is equivalent to Best practicable control technology currently available (BPT). The applicable effluent limitations guidelines for the chlor-alkali plant are found in 40 CFR 415.62 (BPT) and 40 CFR 415.67 (BCT). Guidelines for pH limitations under continuous monitoring are found in 40 CFR 401.17.

2. Best available technology economically achievable (BAT). The applicable effluent limitations guidelines for the chlor-alkali plant are found in 40 CFR 415.63.

3. All known, available, and reasonable methods of treatment (AKART) as authorized by WAC 173-220-130. This state authority is considered to encompass "best professional judgment" as authorized by 40 CFR 125.3, and "fundamentally different factors" where effluent limitations are more stringent, as authorized by 40 CFR 125.30. Performance-based limitations may be considered AKART.

The pertinent federal guidelines are presented in the table below. The guidelines, which are published as pounds of constituent per pound of chlorine produced, have been converted to mass and concentration equivalents using Pioneer Clor's actual production rates and effluent flows. Note that in all cases these federal guidelines are less stringent than the performance-based AKART limitations currently in place and proposed herein.

Table 6

Parameter	Daily Max., lbs/1,000 lbs Cl_2	30-day Avg., lbs/1,000 lbs Cl_2	Daily Max., lbs/day[1]	30-day Avg., lbs day[2]	Daily Max., µg/l[3]	30-day Avg., µg/l[4]	Basis
TSS	1.1	0.51	1,332	514	6,880	3,347	BPT, Diaphragm cells
Copper	0.012	0.0049	14.5	4.9	75	32	BAT, Diaphragm cells
Lead	0.0059	0.0024	7.1	2.4	37	16	BAT, Diaphragm cells
Nickel	0.0097	0.0037	11.7	3.7	61	24	BAT, Diaphragm cells
TRCl	0.013	0.0097	15.7	9.8	81	64	BAT, Diaphragm cells

The technology-based limitations developed for this permit are as follows:

Flow: A maximum limit on flow of 24.5 MGD has been retained from the previous permit.

Total Suspended Solids (TSS): The limitations from the previous permit were originally based on BPT limitations derived for mercury-cell technology. The limitations were calculated from a production rate of 1,090,000 pounds chlorine per day and guidelines of 0.64 pounds TSS per 1000 pounds production daily maximum, and 0.32 pounds TSS per 1000 pounds production monthly average. Because over 85 percent of Pioneer Clor's effluent is intake water from the Hylebos Waterway, a large amount of solids are introduced to and pass through the plant from this source. Therefore, the TSS limitations were based on net increase from intake to the discharge.

DMR data from 1995 indicates that Pioneer Clor has averaged approximately 9 pounds per day net TSS vs. a daily maximum limit of 720 lbs/day and a monthly average limit of 365 lbs/day. Pioneer Clor's production process does not generate significant quantities of TSS in its effluent, nor does Pioneer Clor treat its effluent for TSS. In fact, essentially all TSS originates from Pioneer Clor's Hylebos intake water. Furthermore, there are no water quality standards for TSS. In light of these facts, the existing technology-based limit will be retained but the monitoring frequency will be reduced from monthly to annually.

[1]Based on maximum production rate of 1,211,000 pounds Cl_2 per day taken from 1995 DMR data.
[2]Based on average production rate of 1,007,816 pounds Cl_2 per day taken from 1995 DMR data.
[3]Based on maximum effluent flow of 23.2 MGD taken from 1995 DMR data.
[4]Based on average effluent flow of 18.4 MGD taken from 1995 DMR data.

Nickel: The previous nickel limitations were performance-based limitations that were more stringent than both BAT and water quality-based limitations. Therefore, these limitations will be retained; however, the mass limitation will be converted to a concentration limitation, which will be consistent with other parameters. Therefore, at 23.2 MGD maximum effluent flow (taken from 1995 DMR data), the 2.5 lbs/day daily maximum limitation becomes 13 µg/l. At 18.4 MGD average effluent flow, the 1.4 lbs/day monthly average limitation becomes 9 µg/l. Converting to concentration-based limitations is also consistent with Pioneer Clor's findings in its Internal Streams Study Report that most of its effluent nickel originates in its Hylebos intake water. In fact, the limit will be footnoted to indicate that Pioneer Clor shall not be considered in violation of the permit if it can demonstrate that the effluent concentration is less than or equal to the sea water intake concentration, taking into account the precision of the analytical method.

Lead: The previous lead limitations were performance-based limitations that were more stringent than both BAT and water quality-based limitations. As stated earlier, Pioneer Clor stopped using or processing lead after a plant modernization in 1988. At that time, all diaphragm cells constructed of lead parts were replaced with non-lead containing membrane cells. This has been reflected in the lead levels in its effluent, which have dropped to roughly the background levels found in the Hylebos. Therefore, since Pioneer Clor no longer uses or processes lead, nor do they treat their effluent for lead, and because effluent lead levels have essentially approached background concentrations, this limitation will be eliminated. However, Pioneer Clor shall be required to monitor for lead on a monthly basis and report the results in its DMR.

Copper: The previous performance-based limitations of 9.3 µg/l monthly average and 13.2 µg/l daily maximum were found to be less stringent than water quality standards and will be replaced with water quality-based limitations.

pH: The BPT effluent limitation has been applied in this permit with the exception that outside limits have been placed on excursions to be protective of water quality standards (see discussion of pH in the section on water quality-based limitations). Therefore, the existing technology-based limit will be retained requiring that the total time which the effluent pH is outside the range of 6.0 to 9.0 not exceed one percent of the operating time each month.

Total Residual Chlorine (TRCl): Technology-based permit limitations for TRCl have not been placed in this permit, because water quality-based limitations have been included that are more stringent. In addition, Pioneer Clor has just completed a project to enhance its effluent dechlorination capabilities and insufficient operating data is available to make a performance evaluation at this time.

Chlorinated Organics: Technology-based limitations were previously developed for the following constituents in Pioneer Clor's groundwater treatment plant effluent:

Chloroform
Carbon tetrachloride
1,1-Dichloroethylene
1,1,2,2-Tetrachloroethane
Trichloroethylene
1,1,2-Trichloroethane
Tetrachloroethylene
Methylene chloride

Although the treatment plant started up in February 1993, full scale operation is only now getting underway. At the reduced operational rates reported to date, all constituents have been totally non-detectable. Also, the previously developed technology-based limitations are more stringent than the

corresponding water quality-based standards (refer to Table 9 for a comparison). Therefore, pending review of operational data under full load conditions, the previous technology-based limitations will be retained.

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Surface water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington state (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

Antidegradation

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the state Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed

permit. The discharges authorized by this proposed permit should not cause a degradation of existing water quality or beneficial uses.

Critical Conditions

Surface water quality-based limits are derived for the waterbody's critical condition which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

Mixing Zones

The Water Quality Standards allow the Department to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention and control (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

Description of the Receiving Water

The facility discharges to the Hylebos Waterway which is designated as a Class B receiving water in the vicinity of the outfall. The Hylebos Waterway is part of the Commencement Bay Nearshore/Tideflats Superfund Site. The Hylebos Waterway is also listed on the latest CWA 303(d) report as part of Inner Commencement Bay and is impaired for primary contact recreation due to priority organics and metals. The permit conditions contained herein impose protective controls on priority organics and metals.

Other nearby point source outfalls include the Port of Tacoma Industrial Yard, located northwest of Pioneer Clor, and PRI Northwest, located to the southeast. Characteristic uses for Class B waters include the following: water supply (industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; secondary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for most uses.

Surface Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

1. **Temperature** shall not exceed 19.0 °C due to human activities. When natural conditions exceed 19.0 °C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3 °C. Incremental temperature increases resulting from point source activities shall not, at any time, exceed t=16/T, where "t" represents the maximum permissible temperature increase measured at a dilution zone boundary; and "T" represents the background temperature as measured at a point or points unaffected by the discharge and representative of the highest ambient water temperature in the vicinity of the discharge.

2. **pH** shall be within the range of 7.0 to 8.5 with a human-caused variation within a range of less than 0.5 units.

3. **Toxic, radioactive, or deleterious material** concentrations shall be below those which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the Department.

4. **Aesthetic values** shall not be reduced by dissolved, suspended, floating, or submerged matter not attributed to natural causes, so as to affect water use or taint the flesh of edible species.

5. **Toxic substances** shall not be introduced above natural background levels in waters of the state which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the Department. See Appendix C for numeric criteria for toxics of concern for this discharge.

Consideration of Surface Water Quality-Based Limits for Numeric Criteria

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

1. In the vertical plane, from the receiving water surface to the bottom.

2. In the horizontal plane, 200 feet from the diffuser center.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of a dye study conducted by Pioneer Clor and its consultant on August 31, 1993. Pioneer Clor was required to conduct the effluent mixing study as part of Ecology Order No. DE 93WQ-S190. The results of the study were submitted in a report dated 10/28/93.

To evaluate the study results, the Department ran the PLUMES computer model for effluent mixing and dilution using the input data provided in Pioneer Clor's report. The chronic dilution factor of 15 measured during the dye study agreed well with the model output. The measured acute dilution factor of 4 was also consistent with the model output for flux-averaged dilution (as opposed to centerline dilution),

which is the appropriate measure for marine waters. In summary, the dilution factors have been determined to be:

Table 7

Criterion	Acute Dilution Factor	Chronic Dilution Factor
Aquatic Life	4	15
Human Health, Carcinogen	NA	15
Human Health, Non-carcinogen	NA	15

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of surface water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water. Pioneer Clor has monitored the metals in its sea water intake throughout the previous permit cycle (see Appendix C for tabulated background metals data). The following measured values then are representative of background levels in the waterway:

Table 8

Parameter	90th Percentile Background Level, µg/l
Lead	4.7
Copper	4.0
Nickel	3.8

The critical condition for the Hylebos Waterway corresponds with seasonal maximum waterway stratification and spring flood tide velocities. The chronic and acute dilution factors reported in the August 1993 dye study were measured under relative worst-case conditions that occur less than 5 percent of the time. Therefore, effluent limitations based on these conditions will be protective at other times.

The impacts of temperature, pH, chlorine, lead, copper, and nickel were determined as shown below, using the dilution factors at critical conditions described above.

Temperature: The impact of the discharge on the temperature of the receiving water was evaluated through a comprehensive set of temperature measurements taken during the August 1993 dye study. The study report concluded that the existing two-tiered temperature limit based on receiving water temperatures is protective of the water quality standards. Therefore, the existing temperature limits will be retained. When the receiving water temperature is below 18.5 ^{o}C, a limit of 32 ^{o}C is imposed. When the receiving water temperature is at or above 18.5 ^{o}C, a limit of 24 ^{o}C is imposed.

Because temperature is continuously monitored, consideration has been made for application of continuous data to permit compliance. If the total of excursions is less than 15 minutes in any six hour

period, the permit will not be violated. However, an instantaneous maximum of 34.5 ^{o}C may not be exceeded.

pH: The technology based effluent limit for pH for the Chlor-Alkali Subcategory (40 CFR part 415.62) is between 6 and 9. When a Permittee continuously measures effluent pH, excursions outside this range are permitted in accordance with 40 CFR part 401.17 for a limited time. Federal regulations do not specify the range of pH outside 6-9 within which such excursions are allowed.

The water quality based effluent limit for pH (WAC 173-201A) for a Class B marine waterbody is between 7 to 8.5 with a human-caused variation of less than 0.5 units. The point of compliance with the pH standard is the boundary of the chronic dilution zone at critical conditions. Thus, based on technology, the effluent pH must be within 6 to 9 (with excursions allowed for continuous monitoring) and based on water quality the pH must be within 7 to 8.5 (with a 0.5 unit variation) at the edge of the chronic zone.

Pioneer Clor was required to conduct a receiving water buffering study to determine the range within which excursions of the technology-based limit may be allowed without violating the water quality standard at the edge of the chronic zone. The results of the study were submitted to the Department in a report dated 10/28/93, with a follow-up letter dated 1/28/94.

Buffering capacity was determined by Pioneer Clor with actual titration of Hylebos Waterway samples using effluent at various pH's. At a dilution factor of 15:1 (at the edge of the chronic mixing zone), the limits for excursions of 3.5 and 10.5 previously set by the Department were found to be protective of the water quality standards. If the effluent is at a pH of 3.5, the resultant pH at the edge of the chronic zone would be approximately 7.6 (based on dilution and buffering capacity). Since the water quality standards would allow a resultant waterway pH of as low as 6.5, the 3.5 limit is more stringent than required by the water quality standards. If effluent is at a pH of 10.5, the resultant pH at the edge of the chronic zone would be 9.0 (which is within the 0.5 units allowed above the pH criteria of 8.5 for Class B marine waters).

Therefore, the technology-based limits will be 6 to 9, with the total time outside this range not to exceed one percent of the operating time each month. Individual excursions outside the range of 6 to 9 and within the range of 3.5 to 10.5 shall not exceed 60 minutes per event. To be protective of water quality standards, any excursion below 3.5 or above 10.5 shall be considered a permit violation.

Toxic Pollutants: Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: chlorine, lead, copper, and nickel. A reasonable potential analysis (See Appendix C) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

The determination of the reasonable potential for chlorine, lead, copper, and nickel to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C) at the critical condition. The critical condition in this case occurs during seasonal maximum waterway stratification and spring flood tide velocities. The parameters used in the critical condition modeling are as follows: acute dilution factor 4, chronic dilution factor 15, background lead 4.7 µg/l, background copper 4.0 µg/l, and background nickel 3.8 µg/l (see Table 8).

Calculations using all applicable data resulted in a determination that there is no reasonable potential for this discharge to cause a violation of water quality standards for nickel or lead. This determination assumes that the Permittee meets the other effluent limits of this permit.

Effluent limits were derived for chlorine and copper which were determined to have a reasonable potential to cause a violation of the Water Quality Standards. Effluent limits were determined as follows:

Copper: Copper has been measured in the Hylebos Waterway at levels above the marine acute water quality criteria. Sources more significant than Pioneer Clor contribute copper loading to the Hylebos. Since Pioneer Clor m uses Hylebos intake water for between 85 and 90 percent of its water needs, much of the effluent loading is due to intake loading. 1995 DMR data suggests that on average about 60 percent of the copper in Pioneer Clor's effluent comes from its sea water intake.

Since the background level of copper in the Hylebos exceeds the marine acute water quality standard, the background level shall be the basis of the limitation. This is consistent with WAC 173-201A-070. The 99th percentile copper concentration taken from the last three years of Pioneer Clor's DMR data for its sea water intake is 7 µg/l, as shown in Appendix C. This value will be used as the Daily Maximum limitation. Given this approach, a Monthly Average limitation is not appropriate. As in the case of nickel, the limit will be footnoted to indicate that Pioneer Clor shall not be considered in violation of the permit if it can demonstrate that the effluent concentration is less than or equal to the sea water intake concentration, taking into account the precision of the analytical method.

Total Residual Chlorine: The previous effluent limits of 35 µg/l daily maximum and 12 µg/l monthly average were based on water quality standards. Pioneer Clor has just recently finished a project to enhance effluent dechlorination. Therefore, the previous water-quality based limitations will be retained until additional compliance data becomes available in the next permit cycle.

Chlorinated Organics: Water quality-based limitations for the various chlorinated organics in the groundwater treatment system effluent have not been included because the technology-based limitations are more stringent, as shown in the following table:

Table 9

	Water Quality Standards		
Parameter	**Marine Acute, µg/l**	**Marine Chronic, µg/l**	**Technology-based Limitation, µg/l**
Chloroform	12,000[1]	6,400[1]	75
Carbon tetrachloride	12,000[1]	6,400[1]	10
1,1-Dichloroethylene	224,000	NA	5
1,1,2,2-Tetrachloroethane	9,020	NA	180
Tetrachloroethylene	10,200	450	50
1,1,2-Trichloroethane	NA	NA	5
Trichloroethylene	2,000	NA	440
Methylene chloride	12,000[1]	6,400[1]	185

Whole Effluent Toxicity

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, EC_{50}, IC_{50}, etc. The Department recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

As shown in the following table, the WET tests during effluent characterization indicate that no reasonable potential exists to cause receiving water acute toxicity, and the Permittee will not be given an acute WET limit and will only be required to retest the effluent prior to application for permit renewal in order to demonstrate that acute toxicity has not increased in the effluent.

Table 10

[1]Water Quality Standard for "Halomethanes"

Test Date	Survival in 100% Effluent	LC_{50}	NOEC	LOEC	Survival in Intake water
Acute *Mysidopsis bahia*					
12/93	95%	>100%	100%	>100%	N/T[1]
2/94	100%	>100%	100%	>100%	N/T[1]
4/94	70%	>100%	100%	>100%	N/T[1]
7/94	88%	>100%	100%	>100%	N/T[1]
8/94	98%	>100%	100%	>100%	100%
10/94	95%	>100%	100%	>100%	98%
3/95	98%	>100%	100%	>100%	97.5%
9/95	98%	>100%	100%	>100%	95%
3/96	100%	>100%	100%	>100%	100%
Acute *Menidia beryllina*					
12/93	100%	>100%	100%	>100%	N/T[1]
2/94	93%	>100%	100%	>100%	N/T[1]
4/94	100%	>100%	100%	>100%	N/T[1]
7/94	93%	>100%	100%	>100%	N/T[1]
8/94	98%	>100%	100%	>100%	90%
10/94	93%	>100%	100%	>100%	90%
12/94	95%	>100%	100%	>100%	97.5%
6/95	88%	>100%	100%	>100%	95%
12/95	88%	>100%	100%	>100%	80%
6/96	98%	>100%	100%	>100%	92%

If the Permittee makes process or material changes which, in the Department's opinion, results in an increased potential for effluent toxicity, then the Department may require additional effluent characterization in a regulatory order, by permit modification, or in the permit renewal. Toxicity is assumed to have increased if WET testing conducted for submission with a permit application fails to meet the performance standards in WAC 173-205-020, "whole effluent toxicity performance standard." The Permittee may demonstrate to the Department that changes have not increased effluent toxicity by performing additional WET testing after the time the process or material changes have been made.

As shown in the following table, the WET tests during effluent characterization indicate that no reasonable potential exists to cause receiving water chronic toxicity, and the Permittee will not be given a chronic WET limit and will only be required to retest the effluent prior to application for permit renewal in order to demonstrate that chronic toxicity has not increased in the effluent.

[1] Not tested.

Table 11

Test Date	NOEC Survival[1]	NOEC Growth[1]	LC_{50}	LOEC Survival[1]	LOEC Growth[1]	Survival in Influent Control
Chronic *Mysidopsis bahia*						
6/94	100%	12.5%[2]	>100%	>100%	50%	N/T[3]
10/94	100%	100%	>100%	>100%	>100%	100%
12/94	100%	100%	>100%	>100%	>100%	92.5%
3/95	100%	100%	>100%	>100%	>100%	87.5%
Chronic *Cyprinodon variegatus*						
6/94	100%	100%	>100%	>100%	>100%	N/T[3]
10/94	100%	100%	>100%	>100%	>100%	100%
12/94	100%	100%	>100%	>100%	>100%	100%
3/95	100%	100%	>100%	>100%	>100%	100%

If the Permittee makes process or material changes which, in the Department's opinion, results in an increased potential for effluent toxicity, then the Department may require additional effluent characterization in a regulatory order, by permit modification, or in the permit renewal. Toxicity is assumed to have increased if WET testing conducted for submission with a permit application fails to meet the performance standards in WAC 173-205-020, "whole effluent toxicity performance standard." The Permittee may demonstrate to the Department that changes have not increased effluent toxicity by performing additional WET testing after the time the process or material changes have been made.

Human Health

The Department has determined that the effluent is likely to have chemicals of concern for human health. The discharger's high priority status is based on Pioneer Clor's status as a major discharger and knowledge of Pioneer Clor's data and process information indicating regulated chemicals occur in the discharge.

A determination of the discharge's potential to cause an exceedance of the water quality standards was conducted as required by 40 CFR 122.44(d). The reasonable potential determination for nickel was evaluated with procedures given in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and the Department's Permit Writer's Manual (Ecology Publication 92-109, July, 1994). The determination indicated that the discharge has no reasonable potential to cause a violation of water quality standards, thus an effluent limit is not warranted.

For chlorinated organics in the groundwater treatment system effluent, all analytical results reported to date have been non-detectable. Therefore, the actual technology-based limitations themselves were evaluated against the corresponding human health criteria to verify that the limits are protective of water quality standards. A 150 gpm treated groundwater effluent rate was used in conjunction with a facility outfall effluent rate of 14.5 MGD (the lowest reported in 1995 DMR's) to obtain a 67:1 internal dilution. Consideration of an internal dilution is appropriate because the groundwater treatment system does not operate unless the main facility is in operation. The chronic dilution factor of 15:1 was then used to

[1] NOEC and LOEC values are reported as % effluent.
[2] The data indicated an interrupted dose/response.
[3] Not tested

extrapolate the limitation to the edge of the chronic mixing zone. Again, the determination indicated that the technology-based limits are more stringent than the human health criteria. The results are tabulated below:

Table 12

Parameter	Technology-based Limitations (measured at treatment plant discharge), µg/l	Technology-based Limitations (after 67:1 internal dilution with main facility effluent), µg/l	Technology-based Limitations (after 15:1 dilution at edge of chronic mixing zone), µg/l	Human Health Criteria (organisms only), µg/l
Chloroform	75	1.1	.1	470
Carbon tetrachloride	10	.1	.001	4.4
1,1-Dichloroethylene	5	.07	.005	3.2
1,1,2,2-Tetrachloroethane	180	2.7	.2	2.7
Tetrachloroethylene	50	.7	.05	8.85
1,1,2-Trichloroethane	5	.07	.005	42
Trichloroethylene	440	6.6	.4	81
Methylene chloride	185	2.8	.2	1600

Sediment Quality

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

The Permittee reinjects treated groundwater in wells located adjacent to the Hylebos Waterway as part of its RCRA corrective action for groundwater remediation. Treated groundwater must meet the same limitations as those set for the treatment facility effluent that is discharged to the waterway. Sampling and testing frequency will be the same for both groundwater reinjection and discharge to the waterway.

COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT AS MODIFIED ON 2/22/95

A. Outfall 002

Table 13

	Existing Limits		Proposed Limits		
Parameter	**Daily Max.**	**Monthly Avg.**	**Daily Max.**	**Monthly Avg.**	**Comments**
Flow	24.5 MGD	NA	24.5 MGD	NA	No change
Total Suspended Solids	720 lbs/day	365 lbs/day	720 lbs/day	365 lbs/day	Retain existing limit, but reduce frequency from monthly to annually
Nickel	2.5 lbs/day	1.4 lbs/day	13 µg/l	9 µg/l	Convert mass-based limit to concentration-based
Copper	13.2 µg/l	9.3 µg/l	7 µg/l	NA	New limit based on 99th percentile background level in Hylebos Waterway
Lead	2.5 lbs/day	1.2 lbs/day	NA	NA	Eliminate limit, but continue monthly monitoring
Total Residual Chlorine	35 µg/l	12 µg/l	35 µg/l	12 µg/l	No change
Temperature	32 °C when receiving water <18.5 °C; 24.0 °C when receiving water ≥18.5 °C	NA	32 °C when receiving water <18.5 °C; 24.0 °C when receiving water ≥18.5 °C	NA	No change
pH	Within 6 to 9 range 99% of time in any operating month; excursions of up to 60 minute duration allowed to 3.5 and 10.5		Within 6 to 9 range 99% of time in any operating month; excursions of up to 60 minute duration allowed to 3.5 and 10.5		No change

B. Internal Waste Stream - Treated Groundwater

Table 14

Parameter	Existing Daily Maximum Limit (µg/l)	Existing Monthly Average Limit	Proposed Daily Maximum Limit (µg/l)	Proposed Monthly Average Limit	Comments
Chloroform	75	NA	75	NA	No change
Carbon Tetrachloride	10	NA	10	NA	No change
1,1-Dichloroethylene	5	NA	5	NA	No change
1,1,2,2-Tetrachloroethane	180	NA	180	NA	No change
Tetrachloroethylene	50	NA	50	NA	No change
1,1,2-Trichloroethane	5	NA	5	NA	No change
Trichloroethylene	440	NA	440	NA	No change
Methylene Chloride	185	NA	185	NA	No change

MONITORING AND REPORTING

Effluent monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The monitoring and testing schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

OTHER PERMIT CONDITIONS

SPILL PLAN

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The Permittee has developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the Permittee to update this plan and submit it to the Department.

SOLID WASTE PLAN

The Department has determined that the Permittee has a potential to cause pollution of the waters of the state from leachate of solid waste.

This proposed permit requires, under the authority of RCW 90.48.080, that the Permittee update the solid waste plan designed to prevent solid waste from causing pollution of the waters of the state. The plan must be submitted to the local permitting agency for approval, if necessary, and to the Department.

OUTFALL EVALUATION

Proposed permit condition S7 requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers and to evaluate the extent of sediment accumulations in the vicinity of the outfall.

TREATMENT SYSTEM OPERATING PLAN

In accordance with state and federal regulations, the Permittee is required to take all reasonable steps to properly operate and maintain the treatment system (40 CFR 122.41(e)) and WAC 173-220-150 (1)(g). An operation and maintenance manual was submitted as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). It has been determined that the implementation of the procedures in the Treatment System Operating Plan is a reasonable measure to ensure compliance with the terms and limitations in the permit.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this proposed permit be issued for a period not to exceed June 30, 1999. The Department normally proposes to issue permits for the regulatory maximum duration of five years. However, the Department is currently attempting to get all the permits in Basin 1 (South Puget Sound) to have the same issuance and expiration date. Six months prior to the expiration date the Permittee is required to submit a letter indicating that no material and process changes have occurred at the permitted facility. Based on this letter the permit will be reissued by June 30, 1999, for a normal duration of five years. However, the permittee must submit a complete permit application, at the time of renewal (six months prior to expiration), if significant process or material changes have occurred during the proposed permit duration.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. US EPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. US EPA Office of Water, Washington, D.C.

Tsivoglou, E.C., and J.R. Wallace.
1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Wright, R.M., and A.J. McDonnell. 1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on March 9, 1996 in the Tacoma News Tribune to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) in the Tacoma News Tribune to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, Washington 98504-7775

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6280, or by writing to the address listed above.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Class 1 Inspection--A walk-through inspection of a facility that includes a visual inspection and some examination of facility records. It may also include a review of the facility's record of environmental compliance.

Class 2 Inspection--A walk-through inspection of a facility that includes the elements of a Class 1 Inspection plus sampling and testing of wastewaters. It may also include a review of the facility's record of environmental compliance.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Daily Maximum Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

Monthly Average Discharge Limitation--The average of the measured values obtained over a calendar month's time.

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington state permit writers are joint NPDES/State permits issued under both state and federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

DETERMINATION OF REASONABLE POTENTIAL

Attached are the spreadsheets showing the reasonable potential calculations. Maximum copper, lead, nickel, and total residual chlorine levels in Pioneer Clor's effluent (taken from 1995 DMR data) were evaluated for their potential to exceed state water quality standards. In addition, nickel was also evaluated against the pertinent human health criterion for aquatic organisms only.

Also included in Appendix C are: 1) a summary of Pioneer Clor's 1995 DMR data; and 2) a summary of background lead, copper, and nickel concentrations taken from Pioneer Clor's DMR data.

Table 15. Reasonable Potential calculation

		Max. conc. at edge of		State Water Quality Standard			
	Ambient	Acute Mixing	Chronic Mixing				
	conc.	zone	zone	Acute	Chronic	**Limit**	
Parameter	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	**Teq'd**	Comments
Copper	4.00	7.34	4.89	2.50	100000	**YES**	Water Quality
Lead	4.70	6.07	5.07	151.10	5.80	**0.00**	Water Quality
Nickel	3.80	5.82	4.34	71.30	7.90	**0.00**	Water Quality
Nickel	3.80	5.82	4.34	100000	4600	**0.00**	Human Health
Tot. Resid. Chlorine	0.00	19.10	5.09	13.00	7.50	**YES**	Water Quality

CALCULATIONS:
CONFIDENCE LEVEL >>>> 0.95
(in decimel)

PARAMETER	Prob'ty Basis	*Pn*	Effluent Max conc. *ug/L*	Coeff Var. *CV*	*s*	# of Samples *n*	Multiplier	acute Dil'n Factor	Chronic Dil'n Factor
Copper	0.99	0.78	5.00	0.23	0.80	12	3.48	4	15
Lead	0.99	0.78	4.00	0.18	0.60	12	2.55	4	15
Nickel	0.99	0.78	4.00	0.25	0.70	12	2.97	4	15
Nickel	0.99	0.78	4.00	0.25	0.70	12	2.97	4	15
Tot. Resid. Chlorine	0.99	0.99	333.00	2.34	19.70	365	0.23	4	15

Table 17. Summary of 1995 monthly discharge monitoring report data

	TSS					Cu				Pb				Ni				City water	Production	
	mg/L		lb/D			ug/L		lb/D		ug/L		lb/D		ug/L		lb/D		Flow, avg	Cl2	
1995	in	out	in	out	net	in	out	in	out	in	out	in	out	in	out	in	out	MGD	lbs/D	Days
JAN	10.9	9.5	1341	1368	27	3	4	0.4	0.6	1	4	0.1	0.6	1	2	0.1	0.3	2.4	1082000	31
FEB	10.2	8.7	1510	1436	0	2	3	0.3	0.5	3	3	0.4	0.5	2	3	0.3	0.5	2.1	1154000	28
MAR	11.1	10.3	1443	1524	81	2	3	0.3	0.4	2	3	0.3	0.4	1	4	0.1	0.6	2.1	1120000	31
APR	9.8	7.5	1362	1178	0	3	4	0.4	0.6	5	4	0.7	0.6	2	3	0.3	0.5	2	1166000	30
MAY	11.0	9.1	1628	1511	0	2	5	0.3	0.8	1	2	0.1	0.3	1	4	0.1	0.7	2.4	1178000	31
JUN	9.9	7.9	1520	1420	0	2	3	0.3	0.5	2	3	0.3	0.5	1	3	0.2	0.5	2.9	1002500	30
JUL	12.9	8.7	1909	1505	0	5	4	0.7	0.7	5	3	0.7	0.5	2	3	0.3	0.5	3.1	1178000	31
AUG	11.4	8.3	1687	1436	0	2	3	0.3	0.5	2	3	0.3	0.5	1	2	0.1	0.3	2.6	1211000	31
SEP	10.0	8.7	1440	1383	0	1	2	0.1	0.3	2	3	0.3	0.5	1	2	0.1	0.3	1.9	771000	30
OCT	10.9	8.8	1300	1200	0	3	4	0.4	0.5	1	3	0.1	0.4	2	2	0.2	0.3	1.8	734800	31
NOV	13.8	12.3	1760	1760	0	4	4	0.5	0.6	4	3	0.5	0.4	8	3	1.0	0.4	2	731000	30
DEC	7.1	4.9	767	603	0	1	3	0.1	0.4	2	4	0.2	0.5	4	3	0.4	0.4	1.7	768000	31
AVG	10.8	8.73	1472	1360	9	2.5	3.5	0.34	0.54	2.5	3.17	0.33	0.48	2.17	2.83	0.27	0.44	2.25	1008025	
MAX	13.8	12.3	1909	1760	81.0	5.0	5.0	0.7	0.8	5.0	4.0	0.7	0.6	8.0	4.0	1.0	0.7	3.1	1211000	
SDEV		1.7					0.8				0.6				0.7					
CV		0.20					0.23				0.18				0.25					

	T in		T out		max. pH		min. pH		TRCl				INTAKE			EFFLUENT		
	deg C		deg C		SU		SU		ug/L		lbs/D		MGD			MGD		
1995	avg.	max.	avg.	max.	avg.	max.	avg.	max.	avg.	max.	avg.	max.	act.	avg.	max.	act.	avg.	max.
JAN	7.9	9	26.2	29	7.89	10	6.54	5.6	9	183	0.03	0.8	14.7	15.4	16.7	17.3	17.8	18.8
FEB	8.5	10	25.3	26	7.68	8.5	6.61	5.7	0	0	0	0	17.7	16.8	17.7	19.8	18.9	19.9
MAR	9.2	11.5	25.8	28.5	7.74	8.5	6.59	5	0	0	0	0	15.6	15.9	16.9	17.7	18.0	18.9
APR	10.2	12	26	27.5	7.88	10.1	6.69	3.5	0	0	0	0	16.7	16.5	17.3	18.8	18.5	19.4
MAY	12	14	27	28.5	7.89	8.5	6.84	6.3	0	0	0	0	17.7	17.8	18.8	19.9	20.2	21.9
JUN	13.5	18	27.3	30	8.39	12.7	6.2	0.92	0	0	0	0	18.4	17.6	20.3	21.6	20.5	23.2
JUL	13.9	16	28.5	30	8.16	10.5	6.85	5.9	11	333	0.08	2.3	17.7	17.2	18.4	20.7	20.3	21.6
AUG	14.1	16	28	29	8.06	9.9	6.76	4.8	0	0	0	0	17.7	18.4	19.0	20.7	21.0	21.8
SEP	13.8	15.5	25.5	28	7.94	8.8	6.86	5.4	0	0	0	0	16.9	16.9	18.4	18.7	18.8	20.4
OCT	12.4	15.5	24.6	26.5	7.85	9.1	6.9	6	3	22	0	0.1	14.5	15.9	16.9	16.2	17.7	18.9
NOV	10.4	11.5	23.7	24.8	7.78	8.6	6.93	6.2	0	0	0	0	15.0	13.0	16.2	16.8	15.0	18.0
DEC	8.9	9.9	23.7	25.1	7.75	8.3	6.85	6.2	0	0	0	0	12.7	12.3	13.0	14.5	14.0	14.8
AVG	11.2	13.2	25.97	27.7									16.3	16.1	17.5	18.6	18.4	19.8
MAX	14.1	18.0	28.5	30.0									18.4	18.4	20.3	21.6	21.0	23.2
CV										5*								

* the CV for TRCl was based upon 365 daily average (4-sample) values. 361 of these data points were below the detection levels. In deriving the CV, these non-detects were assumed at one half the detection level (5 ug/L) or 2.5 ug/L.
The four data points above the detection level were 8, 22, 183, and 333 ug/L

Table 18. Background metals concentrations taken from DMR data, 1993-1996.

SEAWATER INTAKE			
Date	Copper, ug/l	Nickel, ug/l	Lead, ug/l
6/10/93	1	3	2
7/7/93	2	3	1
8/10/93	1	2	1
9/8/93	1	2	2
10/6/93	1	2	2
11/3/93	1	2	2
12/9/93	1	4	2
1/6/94	1	2	1
2/1/94	2	3	2
3/8/94	2	1	3
4/5/94	1	1	2
5/4/94	2	2	2
6/6/94	1	2	1
7/6/94	1	2	2
8/3/94	4	1	10
9/14/94	4	2	2
10/4/94	8	7	7
11/9/94	2	2	5
12/6/94	2	1	1
1/10/95	3	1	1
2/8/95	2	2	3
3/8/95	2	1	2
4/11/95	3	2	5
5/10/95	2	1	1
6/7/95	2	1	2
7/19/95	5	2	5
8/8/95	2	1	2
9/13/95	1	1	2
10/10/95	3	2	1
11/9/95	4	8	4
12/6/95	1	4	2
1/3/96	1	1	3
2/14/96	1	3	3
3/12/96	2	4	4
4/10/96	1	3	2
5/1/96	1	2	2
6/5/96	2	3	1

	Copper, ug/l	Nickel, ug/l	Lead, ug/l
'93 AVG:	1.1	2.5	1.5
STDDEV:	0.3	1.0	0.5
'94 AVG:	2.5	2.0	3.0
STDDEV:	1.9	1.7	2.8
'95 AVG:	2.5	2.0	2.4
STDDEV:	1.1	2.0	1.4
'96 AVG:	1.3	2.7	2.5
STDDEV:	0.5	1.0	0.9
ALL AVG:	2.1	2.2	2.4
STDDEV:	1.5	1.6	1.9
MAX:	8	8	10
90th PERC.:	4.0	3.8	4.7
99th PERC.:	6.9	7.7	9.0

APPENDIX D--RESPONSE TO COMMENTS